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Socioeconomic status is a critical risk factor for human rabies post-exposure prophylaxis

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ABSTRACT

The socioeconomic status of the patients is the important factor for post-exposure prophylaxis (PEP). However, few investigations were designed to study the correlation between the socioeconomic status and PEP. This study set out to determine the importance of socioeconomic status for PEP. All of the 11,670 at-risk populations of rabies in the public health centre of San Sheng County in Chengdu from January 2002 to December 2009 were reviewed retrospectively. We identified 11,350 patients on vaccination and 550 patients with rabies immunoglobulin. RIG was administered to 4.85% bite victims attending the rabies prevention clinics, while 61.36% had a category III exposure. The incidence of receiving RIG in the population of the high level of income (49.38%) was much higher than the groups of the medium level (8.08%) and the low level of income (1.46%) ($P < 0.05$). The incidence of receiving RIG with above high school (23.08%) was much higher than the groups of the primary school (3.01%), the junior school (12.56%) and the illiteracy (2.08%) ($P < 0.05$). In the logistic regression analysis by stepwise approach, the socioeconomic status was the most important factor for PEP (95% CI 1.20–2.04). Vaccination and immunoglobulin proved to be the most prominent two factors for PEP but whether receiving Vaccination and immunoglobulin treatment or not is determined by the socioeconomic status. So, the socioeconomic status was the most important factor for PEP.

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1. Introduction

Rabies is a fatal disease of man and animals. Despite the fact that rabies is preventable with proven, effective measures: immediate wound washing, wound infiltration with rabies immunoglobulin, and a course of vaccination using WHO recommended cell culture vaccines [1,2], human mortality from endemic canine rabies is estimated by WHO to be around 55,000 deaths annually [3]. The estimated annual death toll in Asia is over 31,000 or one death every 20 min because of socioeconomic status, education, consciousness and so on [3–5]. However, there were few people to study the correlation between the socioeconomic status and PEP. In order to identify socioeconomic status is the important factor for PEP and for better definition of the most urgent actions to be undertaken; all of the 11,670 at-risk populations of rabies in the public health centre of San Sheng County in Chengdu from January 2002 to December 2009 were reviewed retrospectively.

2. Patients and methods

2.1. Study location and patient population

This study was conducted at the public health centre of San Sheng county in Chengdu, referral care center, rabies post-exposure prophylaxis in rabies prevention centers, serving Chengdu city and the surrounding area. All of the 11,670 at-risk populations of rabies out-patient clinic (OPD) in this department from January 2002 to December 2009 were eligible for investigation.

A database was established by Excess Software for the study. Data collected on standardized case report forms included two parts: information on the patient and his/her rabies exposure history was obtained from the patient interview (or one of his/her parents or guardians, for minors); and information regarding the evaluation of the bite exposure and the post-exposure prophylaxis administered was filled-out by the investigator.

2.2. Patient information

Information was collected regarding the age and sex of the patient. The socioeconomic status was evaluated as low, medium

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or high, according to the patient's own evaluation and confirmed according to the following criteria: level of education (none, primary school, secondary school, or higher), habitation (owner or non-owner and the housing category); and the patient's belongings (vehicle, television, telephone, etc.). The socioeconomic status of minors was determined to be the same as their parents'. The location of the patient's residence was noted (rural or urban) and its distance from the rabies prevention centre (evaluated in time).

2.3. Information on the present exposure

Patients were asked to provide information regarding the biting animal. The category of exposure and the number of wounds were documented by the investigator.

2.4. Rabies post-exposure management

The time elapsed between rabies exposure and consultation at the rabies prevention centre was recorded. Rabies post-exposure prophylaxis administered at the rabies prevention center was also documented by the investigator.

2.5. Statistical analysis

Data analysis was performed with SPSS 11.5 for Windows. To identify potent risk factors for rabies in rabies post-exposure patients, binary logistic regression mode was performed for multivariate analysis. The more important objective in this article was to compare differences in incidence of vaccination immunoglobulin under certain classes of rabies post-exposure patients and to study the relationship between the incidence of vaccination immunoglobulin and the socioeconomic status of the patients and to study the relationship between incidence of vaccination immunoglobulin and literacy degree of the patients. Rate per 100 cases was calculated. The corresponding 95% confidence intervals (95% CI) of incidence were calculated and interpreted by the normal approximate method or direct method. Differences in two proportions were compared with the chi-square test or Fisher's exact test. Differences in multiple proportions were compared with Scheffe method. All P-values were 2-tailed, and $P \leq 0.05$ was considered statistically significant.

3. Results

3.1. Population

11,670 subjects from the public health centre of San Sheng County were completed and used in the analysis. The male/female sex ratio was 1.15:1 (624/543), and the mean age of animal bite victims referred to the rabies prevention clinic was 30.08 years. 10,792 (95.08%) patients were from rural, 4.92% patients lived in urban. Among these patients, 67.95% came from elementary school, 17.22% from junior high school and only 6.6% from above senior high school (Table 1). There were two high age stages: one is children under 10 years of age (29.13%), the other is the adults during prime of one's life between 30 and 45 years of age (25.79%) (Table 1).

3.2. Socioeconomic status

The distribution of socioeconomic status of patients was given in Table 1. 76.78% patients were in low socioeconomic status, according to the defined criteria. 16.54% patients were in medium socioeconomic status; only 6.68% belonged to the high socioeconomic category.

Table 1
The basic information of patients.

Categories	Number	%
Sex	11,670	100
Male	6240	53.47
Female	5430	46.53
Age	11,670	100
<15	4160	35.65
15~	1590	13.62
30~	3010	25.79
45~	1940	16.62
60~	820	7.03
75~	150	1.29
Education	11,670	100
Illiteracy	960	8.23
Elementary	7930	67.95
Junior high school	2010	17.22
Above senior high school	770	6.60
Income	11,670	100
Low	8990	77.04
Middle	1910	16.36
High	770	6.60
Living	11,670	100
City	490	4.20
Country	11,180	95.80
Exposure time	11,670	100
<4h	7491	64.19
4–24 h	3259	27.93
24–48 h	300	2.57
2–10 days	560	4.80
>10 days	60	0.51
The degree of injury	11,670	100
I	270	2.31
II	4240	36.33
III	7160	61.36

3.3. The information of the wounding animals

For the present exposure, among the wounding animals there were 94.23% dogs, 3.43% cats and 2.34% were other animals. Though 37.36% animals were tied down, there were 49.27% untied animals and 13.37% wild animals. Unexpectedly there were 59.64% animals without vaccination and 15.34% animals with unclear vaccination (Fig. 1). Furthermore, there were more and more wounding animals without vaccination from 2005 to 2008 (Fig. 1).

3.3.1. Wound characteristics of the exposure

Though 98% percent of all patients were living in rural, 64.19% patients visited the rabies centre within 4 h of exposure, 27.93% patients visited the rabies centre between 4 and 24 h of exposure. However, it took over 1 day for about 2.57% of all bite victims to visit a prevention centre and more than 2 days for 5.31% of bite victims to visit a centre (Table 1).

3.4. Post-exposure prophylaxis

The category of rabies exposure was available for 11,670 patients (100%). There were 2.31% patients with estimated category I exposures, 36.33% patients with estimated category II exposures, 61.36% patients with estimated category III exposures consequently requiring the use of immunoglobulin in addition to vaccine (Table 1). Wound location was known for 11,670 patients. In 66.84% of these cases, wounds were located on lower limbs. Furthermore, quarter of the patients with category III exposure had several bites.

3.4.1. Vaccination

The vast majority of patients were immunized using the rabies vaccine prepared (RVP) on vero cell for human use (96.92%) or the rabies vaccine (RV) for human use (3.08%) by IM (Table 1).

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